

# Study on Risk Factor Evaluation of Ischaemic Stroke Patients Admitted in a Tertiary Care Hospital: 100 Cases

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**Abstract:** *Background:* Stroke is defined as a sudden onset focal neurological deficit of vascular etiology and is a major cause of mortality and morbidity around the globe. The aim of this study was to find out the proportion of major risk factor or factors related in infarctive stroke cases. *Methods:* This hospital based descriptive cross sectional study was carried out in one hundred (100) ischemic stroke patients admitted in Medicine units associated with Neurology ward in Enam Medical College & Hospital, Savar, Dhaka, Bangladesh during the period from January 2015 to September 2017. Permission for the study was taken from the mentioned departments and authorities. Subjects were selected in all age groups and both male and female patients to whom duration of illness were less than 72 hours. *Results:* Among all, 61% were male and 39% were female and male female ratio 1.56:1. The maximum number of patients (36%) were in between 61-70 years of age. Majority of the patients (40%) came from middle class (TK. 7000-10,000/Month). A significant number of patients had high level of lipid profile e.g. Total cholesterol (>200 mg/dl) 73.33%, LDL (>150 mg/dl) 60%, TG (>150 mg/dl) 70%. In many cases multiple risk factors were present. It was observed that hypertension was the most common major risk factor for stroke. Among the 60% of the hypertensive patients only 45% were controlled with treatment and 33.33% were uncontrolled with treatment and 21.66% did not take any medicine or measures. About 47% were smoker. Diabetes mellitus was detected in 26% of patients which is lower than hypertension and hyperlipidaemia. About 25% of patient had history of previous stroke and 20% patient had family history of stroke. Only 6% was alcoholic. Among the female patients 5% received oral pills. *Conclusion:* Hypertension is one of the major risk factors for the stroke. For the management and prevention of hypertension like stroke, we are recommending the following measures like Hypertension screening programme for early detection, management and follow up and increase awareness regarding hypertension and its complication. It should be controlled by personal motivation, anti-smoking campaign, banding of the smoking propaganda in the TV, Radio, News paper, poster, banner, leaflet etc. Ensure punishment for smoking in open public places and public transports.

**Keywords:** Ischemic, Stroke, Hypertension

## 1. Introduction

The term stroke can be defined as a focal neurological deficit of sudden onset, lasting for more than 24 hours,

occurring as a result of non-traumatic pathological process involving the blood vessels of the brain, so the patient having a stroke is diagnosed as cerebrovascular disease/ accident (CVD/CVA). [1]

WHO defined stroke as rapidly developed clinical signs of focal disturbance of cerebral function lasting for more than 24 hours or leading to death without any apparent cause other than vascular origin. [2] Stroke is third leading cause of death after heart disease and malignant disease. All over the world morbidity of stroke is also one of the important family, social and country burden as well as, which demands serious medical, socio-economic and rehabilitation issue. [3]

Cerebrovascular disease is predominating in the middle and late years of life. The incidence increases with age and the disease affects many people in their golden years. It is estimated to be responsible for 9.5% of all deaths and 5.1 million of the 16.7 million cardiovascular disease deaths. [4] In developed country there is an overall prevalence of stroke is 794 per 1000000 populations. In the United states it is estimated that more than 400000 patients are discharged each year from Hospital after a stroke. The age adjusted annual death rate from stroke is 116 per 100000 population in the USA and some 200 per 100000 in UK. It is higher in Afro Caribbean population than Caucasian. It is uncommon below the age of 40 years and more common in male. Death rate from stroke is 25%. [5] In Bangladesh adequate data is lacking on the incidence and mortality from stroke. Nevertheless the gravity of the situation can easily be assessed by the high incidence of Hospital admission for similar illness.

Stroke occurs when blood vessels that carry blood to the brain suddenly becomes blocked or burst, preventing blood flow to the brain. [6]

On the basis of this pathophysiology, stroke is divided into infarcts (thrombotic or embolic) and haemorrhage. Ischaemia and infarction constitute 85-90% of the total stroke in the Western countries, while 10-15% are intracranial haemorrhage [7] but haemorrhages constitute a larger percentage in Asia. [8]

The appearance of the disease is influenced by many etiological factors that is risk factors. Risk factors of stroke. [5] Cerebrovascular disease can be divided into: Major risk factors include-1. Advanced age, 2. Arterial hypertension, 3. Cigarette smoking, 4. Diabetes mellitus, 5. Hyperlipidaemia, 6. Thrombotic manifestations. [5] Other risk factors are: 1. Positive family history, 2. High alcohol intake, 3. Oral contraceptives, 4. Collagen vascular disease 5. Past history of CVD and 6. Obesity [3]. Life style factors such as: eating habits, obesity, smoking, alcoholism and physical and mental inactivity, increase the risk by many folds. [9]

Throughout the world, unfavorable trends in stroke risk factor profile, lack of prevention programs, misapplication or underutilization of stroke preventives lead to high stroke rates serve to widen the stroke prevention gap. This is unfortunate because stroke is well suited for prevention since it has a high prevalence economic cost, well-defined modifiable risk factors, and effective prevention measures. [10]

Regarding management of stroke, none can claim for the total cure of the disease but can prevent to some extent by early detection and proper management of risk factors.

In this hospital based descriptive (cross sectional) study effort will be made to identify in patients under study the risk factors present in context, to our compair either isolated or in combination, so that preventive measures can be taken earlier to reduce economic burden of this most disabling disease.

## 2. Methods

This hospital based descriptive cross sectional study carried out on one hundred (100) ischemic stroke patients admitted in Medicine units including Neurology ward in Enam Medical College & Hospital, Savar, Dhaka, Bangladesh during the period from January 2015 to September 2017. Permission for the study was taken from the concerned departments and authorities. Following patients were included in the study: All infarctive stroke patients (confirmed by CT scan of brain) admitted in medicine units including Neurology, Patients of all age group and both male and female patients and duration of illness less than 72 hours. Case sampling was done consecutively. The initial Clinical diagnosis was made from detailed Clinical history from the patients or from his or her attendants and thorough Clinical examination especially neurological examination and examination of cardiovascular system. Subsequently it was confirmed by CT scan of brain. After an initial clinical diagnosis being established, further detailed history relevant to risk factors like hypertension, diabetes mellitus, ischemic heart disease, Cigarette smoking, hyperlipidaemia, obesity, family history, bleeding diathesis, connective tissue disorders, hyper viscosity syndrome, use of oral contraceptives, alcoholism and head trauma were taken from patient as well as his or her close family members. Informed consent had been taken from the patient or from the attendant of the patient for participation in the study. Routine investigations such as CBC with ESR, urine R/M/E, blood glucose fasting and 2 hours after breakfast, fasting lipid profile, serum electrolytes, kidney function tests, chest x-ray, ECG were done in all cases. CSF study, Echocardiography, Antinuclear factor (ANF), C - reactive protein (CRP), c-ANCA, p-ANCA, MRI of the brain, MRA (Magnetic resonance angiography), lupus serology were done in selective cases. Patients were followed up during their stay in hospital to observe the outcome. Data of the patients were recorded in a predesigned case record form (C. R. F). After collection of data, results were analyzed and presented by simple statistical percentage and tabulated form.

## 3. Results

**Table 1.** Distribution of the study patients by demographic characteristics (n=100).

Demographic characteristics	Number of patients	Percentage (%)
Age (years)		
0-20	0	0

Demographic characteristics	Number of patients	Percentage (%)
21-30	1	1
31-40	6	6
41-50	16	16
51-60	24	24
61-70	39	39
>70	14	14
Sex	97	97
Male	61	61
Female	39	39
M: F ratio	1.56:1	
Residence		
Urban	47	47
Rural	53	53
Income status		
Poor (<TK 3000/month)	20	20
Below average (TK. 3000-7000/month)	32	32
Average (TK. 7000-10000/month)	40	40
Affluent (TK.>10000/month)	4	4
Occupation		
Business	21	21
Service holder	22	22
Cultivator/Farmer	14	14
School Teacher	6	6
Worker	6	6
House wife	24	24
Others	8	8

The maximum number of patients (36%) in these study were between 61-70 years followed by (24%) between the age of 51-60 years. The incidence of stroke shows male preponderance with ratio of male to female is 1.56:1. The majority of patients composed of house wife (24%) among female, service holder (22%) and business (21%) among the study population. The above table shows that the average class group (40%) comprises the major percentage of the patients, followed by below average class group (32%). The above table shows that patients came from both urban and rural areas with slight rural (53%) preponderance.

**Table 2.** Risk factors for ischaemic stroke (n=100).

Risk factor	Number of patients	Percentage (%)
Hypertension	60	60
Smoking	47	47
Diabetes Mellitus	26	26
Hyperlipidaemia	30	30
Alcohol intake	6	6
Oral contraceptive	5	5
Past history of CVD	25	25
Family history of stroke	20	20
Obesity	20	20
Heart disease	18	18

In this study, hypertension (60%) was found to be the most common risk factor. Next factor was smoking (47%) followed by hyperlipidaemia (30%), diabetes mellitus (26%) and CVD (25%).

**Table 3.** Distribution of the study patients by type of hypertension (n=60).

Hypertension	Number of patients	Percentage (%)
Controlled	27	45.0
Uncontrolled	20	33.33
Not treated	13	21.66

In the above table, it shows that among the hypertensive patient only 45% controlled with treatment, 33.33% uncontrolled and 21.66% not treated at all.

**Table 4.** Descriptive statistics of lipid profile (n=30).

Lipid profile (Fasting)	Number of patients	Percentage (%)
Total cholesterol (>200 mg/dl)	22	73.33
LDL (>150 mg/dl)	18	60.0
TG (>150 mg/dl)	21	70.0
HDL (<35 mg/dl)	10	33.33

Serum cholesterol is found above normal range in 73.33% (average)

**Table 5.** Relationship between physical activity and stroke (n=100).

Physical activity	Number of patients	Percentage (%)
Harder worker	8	8
Moderate worker	48	48
Sedentary worker	36	36

The maximum number of patients in this study were moderate workers (48%). Hard workers (8%) composed the smallest group.

**Table 6.** Outcome of the patients during discharge (n=100).

Status of the patients	Number of patients	Percentage (%)
Improved	65	65
Static	15	15
Death	8	8
DOR (Discharge on request)	12	12

Out of total 100 patients, 65% improved, 8% died, 15% of the patients static and 12% patient discharged on request.

## 4. Discussion

The effect of various risk factors on stroke has been shown similar as well as considerable variation in different studies. In this study, peak age of incidence was between 61-70 years 36%, [Table 1] followed by 51-60 years 24%, 41-50 years 16% and above 70 years was 14%. Many studies [11-14] reported the same age incidence between 5<sup>th</sup> to 7<sup>th</sup> decade in our country. It also coincided with the similar type of previous studies done by Kannel et al. [15], Chapman et al. [16], Dalal et al. [17] and Pessah et al. [18]. This study showed only 14% cases were above the age of 70 years. This finding strongly contradicted with the study conducted by WHO task force in 1989 and study by Aho et al, where the peak incidence of stroke was at above the age of 85 years. This discrepancy with the present study may be due to the normal life expectancy of 60 years in our country, which is less than that of the study group of WHO. In this study, 61% male and 39% were female i.e., male incidence is 22% higher than female and the ratio was 1.56:1 which is close to Thompson study. But a similar study [19] showed gross differences (M: F=4:1) with higher male predominance.

In present study among the study people, hard worker 16%, moderate worker 48% and sedentary life style 36%. Majority of the patients were moderate workers. This results contradict with the study of Bashar [11], Manadir [12], Harsmen et al. [20], Keily et al [21] They found that moderate to hard work or physical activity among men had

protective role against stroke. It needs further study but no significant protective role noted in women.

On the occupational basis (Table 1), businessmen in population 21%, farmers 14% and house wives in female population 24% were significantly affected. Number of retired person simulates with that of Bashar study [11] resulting in extra burden on national economy. In most of the developed countries, retired persons mostly affected are >65 years. There were significant increase of strokes among the housewives which demand special attention to search for the causes and risk factors. In this study we found that hard workers and school teachers were less affected. High level of physical activity among male are protective against stroke relative to low level of physical activity. [21]

On the basis of socio-economic status (Table 1), the middle class (Monthly income TK. 7000-10000) comprise the majority (40%) followed by lower middle class (Monthly income TK. 3000-7000) comprises 32%. This result contradict with study by Hart CL et al. [22], study of Bashar [11] and study of Manadir. [12] It needs further detail evaluation. The higher income group (>10,000/month) was only 4% and lower income group (<3000/month) was 20%. From this study we get the impression that lower and higher income groups suffer from stroke but this may not be true in case of lower income group because many of the poor patients were not brought to hospital due to economic constrain, ignorance and poor transport facilities. In this study the lower economic group patients were admitted to the hospital came from outside the city area. The rich group of people was not taken into the hospital due to shortage of bed and other facilities. But this study also supported the study of Botania 1992, Bashar [11] and Manadir. [12] This study showed that (Table 1) study subjects were from both urban (47%) and rural areas (53%) with slight rural preponderance (6%) which indicate that the incidence of stroke is common in both urban and rural population. This study was coincided with the study of Manadir [12], but strongly contradicted with the study of Bashar [11] which showed mainly urban predominance. The reason may be that study of Bashar was done in a private hospital with narrow catchment area, where mostly urban population can avail the hospital facilities mainly due to cost. [11] The present study was done in Chittagong Medical College Hospital where patients come from city as well as remote rural areas. This study also contradicted with the study of Engstrom et al. [23]

The present study showed that 47% were smoker. Multiple individual studies have demonstrated that the risk of stroke is increased among the cigarette smokers. Yano et al. [24] and Donnan et al. [25] had shown strong association between cigarette smoking and stroke. Similar study in Copenhagen [26] and Finland [27] had shown increased risk of stroke among smokers. New Zealand researcher reported that passive smoking significantly increases the risk of stroke among the non-smoker and long term ex-smoker. [25]

Present study showed that 26% (Table 2) stroke patients were diabetic. Diabetes mellitus has long been recognized as a risk factor for vascular disease as well as stroke. It is about double

the risk of stroke compared with that of non-diabetics. [15] The Framingham study showed that 10-14% of stroke patients were diabetic. In BIRDEM by Latif et al. [25], a study on 165 cases of diabetic patients, all of them developed stroke in less than 10 years duration. The Copenhagen stroke study had shown that in 1135 acute stroke patients, 233 (20%) were suffering from diabetes and diabetes mellitus influenced stroke in several aspects e.g. age, subtype, speed of recovery and mortality. [29] Oral /injectable (Hormone/implant) contraceptive: (Table 2) showed that 5% of the female patients gave history of taking oral pills and injections. Heinemann et al showed that there is slight increase in the relative risk of thromboembolic stroke in women currently using contraceptives compared with women not using them. He also concluded that the attributable risk is very small because the incidence in this age range is very small. The high dose estrogen pills carry higher risk than low dose formulation irrespective of type of the progestin. [30] There are no differences in risk of oral contraceptives of third and second generation, only first generation oral contraceptive seems to be higher risk.

In this study, 25% of the patients had previous history of some form of cerebrovascular disease (Table 3). This result contradicted with the study of Manadir [12] (9%) and with the study of Aho et al. [2], Walker et al. [31] who showed that 4.3 to 33.5 percent of the patients suffering from acute stroke had a past history of one or more strokes.

In Table 3, showed that 20% patients of stroke had positive family history. This finding has little value to the incidence of stroke, because it is likely to be the result of an inherited tendency to one of the other risk factors. A positive family history was not an independent risk factor in multifactorious analysis but it was an excellent marker of the presence of other established vascular factors. [32] Another study has found a positive family history of stroke, diabetes mellitus, hypertension or ischaemic heart diseases in 13.1% of their stroke patients. [33]

In this study, 20% patient were detected obese (Table 3). Peart SS et al. [34] had shown that the obesity has significant contribution to the risk of stroke of untreated patient of either sex. So findings in this study correlate well with above mentioned study. Honolulu heart program study [35] concluded that elevated body mass is associated with increased risk of thromboembolic stroke in non-smoking men and in older middle age people. A 20 years follow up study in Scotland [22] showed that although participant with highest body mass index had highest stroke rate. Rhados and Kagan 1980 studied 8006 younger Japanese men and concluded that obesity was positively related with stroke incidence. So, the relationship between obesity and stroke needs further evaluation. Only 6% (Table 3) of this study sample had history of alcohol consumption. This lower incidence of alcohol intake of our study is related to socio-cultural and religious inhibition. But there is definite relation between alcohol consumption and the occurrence of stroke. Macfarlane et al. [36] concluded that heavy drinking increased the incidence of stroke compared to non-drinker or occasional drinker. This study failed to determine the direct relationship.

In this study (Table 3) 18% cases had association with heart disease. Similar study by Hayee *et al.* [37] on 427 stroke patients found 29.66% were suffering from different heart diseases. In the present study, out of 18 patients, 12 (66.66%) had myocardial infarction/ischaemia, 1 (5.55%) had valvular heart disease, 5 (27.77%) had heart failure. Ischemic heart disease, heart failure definitely augment the risk of strokes. [38] A study done by Macfarlane PW *et al* 1991 [36] in Britain over middle aged British men, it has been shown that men with definite evidence of previous myocardial infarction had four fold increase risk of strokes compared to men with no pre-existing ischemic heart disease. Bundlie [39] revealed that 24% of stroke patients had evidence of recurrent myocardial infarctions. In the present study no stroke due to congenital heart disease was found.

In this study (Table 3) hypertension emerges as the important and most common risk factor in ischaemic stroke. Out of 60 cases (60%) only 27 patients were controlled with antihypertensive drugs and rest 20 were uncontrolled with antihypertensive drugs, 13 patients were not treated at all. This study was correlated with similar type of study done by Hayee *et al.* [37] (52.11%), Mannan and Alamgir [19] (58%), Latif *et al* [28] (50.03%). Similar studies in some Asian countries also correlate with the present study. Wong [40] studied 3670 hospital admitted stroke patients in several South East Asian countries and found 64% hypertensive. In prospective study in Shanghai, China by Ross RK *et al.* [41], hypertension was the most important risk factor for stroke. The result correlates with the study of urban population of Calcutta in 2001, where hypertension was found to be the most significant risk factor. In the Japanese centre the association of hypertension was about 75% and in Moscow and in Ulan Bator it was even higher. [2, 22]

In the present study (Table 3) non compliance to the treatment of hypertension was quite high 33.33%. Chowdhury SGM *et al.* [13] in their study of 78 known hypertensive patients who suffered from stroke, had shown that 92.54 percent were taking drugs irregularly. Raised serum cholesterol is an important risk factor in ischaemic heart disease but its relation with stroke was not clear. [42] In this study, out of 30 patients (Table 4) total cholesterol was raised in 22 patient (73.33%), LDL raised in 18 patient (60%), TG raised in 21 patient (70%) and decreased HDL in 10 patient (33.33%). This finding was nearer to the findings of Hayee *et al.* [37] In their study they found 19.07% of total cases of strokes had elevated serum total cholesterol. But present study has contradicted with the study of Bashir [11] (15%) and Mandir (12%). [12] However, the relationship between stroke and hyperlipidaemia needs further research. Finally (Table 6), out of 100 patients 65% improved, 15% were in static condition, 8% expired and 12% were discharged on request.

## 5. Conclusion

Stroke is one of the major causes of not only morbidity and mortality but also exerts enormous burden to the

economy of the country. This devastating and dreadful condition not only affect the patient but also their family and the society. Study reveals that hypertension is the number one major risk factor for the stroke. Smoking is the second most important major risk factor for stroke.

- a. Hypertension screening programme for early detection, management and follow up.
- b. Smoking is the second most important major risk factor for stroke. It should be controlled by personal motivation, anti-smoking campaign, banding of the smoking propaganda in the TV, Radio, Newspaper, poster, banner, leaflet etc. Ensure punishment for smoking in open public places and public transports.
- c. Diabetes mellitus should be properly screened, diagnosed and managed.
- d. Hyperlipidaemia should be properly emphasized and evaluated. It demands further study to correlate with stroke.

Stressful life style among the lower middle class stroke patients in our country needs extensive research. Finally it is clear that the best way of facing stroke is prevention and controlling the modifiable risk factors and search for new emerging risk factors which are contributing in stroke pathogenesis.

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